ASSEMBLY INSTRUCTIONS

OHR100A
20M

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Division of

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OHR 100A CW Transceiver Kit

Introduction

Thank you for purchasing the OHR100A transceiver kit. The OHR100A is a single band superhet CW transceiver and the kit contains all necessary parts for assembly and installation, including a schematic diagram, large parts overlay diagram, and complete parts list.

Features

- Stable pre-mix VFO circuit providing 70 KHz of coverage and high side injection.
- RIT Circuit providing 1 KHz of range.
- Four Pole crystal Cohn filter, continuously variable from 1200 Hz to 400 Hz.
- True sinewave sidetone oscillator with frequency and level adjustment.
- Silky smooth QSK circuit.
- 4 - 5 Watts of RF output on all bands, adjustable from 0 - full output..
- 70 mA current drain on RX; 850 mA current drain on TX
- Double-sided PC Board construction - plated-thru holes, component screen, and pre-assembled Molex 3 circuit connectors.
- Easy to Align – an oscilloscope is not required for alignment.

An iambic electronic keyer, and a 10-turn VFO tuning pot are available as options.

You will need the following tools to assemble your kit: normal hand tools which include long-nose pliers; diagonal cutters; phillips head screwdriver; small bladed regular screwdriver; pliers; 20-30 watt pencil type soldering iron with a very small tip; magnifying glass; magnifying light; and a supply of *ROSIN CORE* solder. We use, recommend, and sell convenient pocket packs of Kester's "245 No-Clean" solder. A desoldering bulb and desoldering braid are also helpful to have.

Soldering is one of the most important operations you will perform while assembling your kit. About 95% of all kits returned to us for repair have problems caused by poor soldering. A good solder connection will form an electrical connection between two parts, such as a component lead

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and a circuit board foil. A bad solder connection will prevent an otherwise well assembled kit from working properly. It is easy to make good solder connections if you follow a few simple rules. Use the correct type of soldering iron. A 20-30 watt pencil soldering iron with a very small type works well. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth, then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good solder connections. When the solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and retinned. Always use *ROSIN CORE* radio type solder (60:40 tin-lead content) for all the soldering in this kit. The warranty will be void and we will not service any kit in which acid core solder or paste has been used.

For a good overview of kit building techniques and practices, read N1FN's comprehensive article "A to Z of Electronic Construction." It is available from OHR in hard-copy for a nominal fee, and it's free on the World Wide Web at www.MorseX.com/build/atoz.htm.

ASSEMBLY NOTES

The parts list contains a PARTS ID # and DESIGNATOR #. Use the PARTS ID # to help identify parts. The DESIGNATOR # is used on the schematic diagram and PC boards to identify individual parts. Some parts may be supplied on a tape. Use your cutters to cut the component leads from the tape. Never pull the components from the tape. All components are mounted on the component screen side of the board. All horizontal mounted components are positioned down against the board.

The PC boards supplied with this kit use extra thin circuit traces and are extremely fragile. They can easily be damaged when attempting to remove a soldered part. Both boards are double sided with plated through holes. When you assemble the boards, *BE ABSOLUTELY SURE YOU HAVE THE CORRECT COMPONENT IN THE CORRECT LOCATION BEFORE SOLDERING IT IN PLACE. DOUBLE CHECK YOUR WORK BEFORE SOLDERING*. With plated through holes, once you have soldered a component in place, it is much more difficult to remove. If you do make a mistake and want to remove a component, follow this simple procedure. Use your desoldering bulb and desoldering braid to remove *ALL* solder from the holes. Make sure the component leads are loose and free in the holes before removing the component.

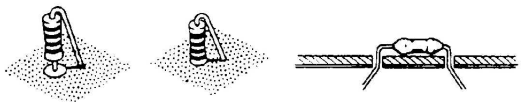
Use care when handling the cabinet parts, as some may have sharp edges. You should also wear eye protection to prevent a cutoff lead clipping from flying up into your eye. An additional safeguard against this type of injury is holding the component lead as you cut it.

The OHR100A is not difficult to build. Just take your time and use common sense. Don't work too long at one time; take frequent breaks. Read through all the steps in the instructions before beginning the kit, as this will help you become familiar with the kit and may prevent mistakes.

Board Assembly

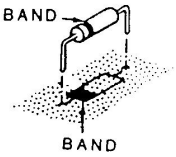
❒❒ 1.1 Begin by unpacking the parts and taking inventory. It will help to sort the components by type and value. Keep the package labeled BANDPACK separate as these parts will be installed later. The parts identification drawings and notes on pages 23-24 will be helpful. As shown at the left side of the page here, two check boxes are provided to help you keep track of progress. Check off one box as you complete each step. Check off the second box when you go back to review your work.

❒❒ 1.2 All of the parts are mounted on the top side of the circuit board. Position the board in front of you with the component overlay screen up and J100 at the upper left corner.. Refer to the parts list and the parts overlay diagram to help identify parts.



"Install" means to physically install the component at the proper location on the circuit board, then turn the board over and solder the leads, and trim the leads. All diodes are mounted horizontally. Some resistors and chokes are mounted vertically (sticking up from the board) and some are mounted horizontally (lying flat on the board). As shown in the drawing, vertically mounted components should be mounted with the body of the component in the hole marked with a circle on the circuit board. This allows access to the other end for testing.

❒❒ 1.3 In the following steps you will install several diodes. Be sure to position the banded end as shown on the circuit board.



❒❒ 1.4 Install 1N4148 diodes at D108, D111.

❒❒ 1.5 Install 1N34A diodes at D101, D107.

❒❒ 1.6 Install a 1N4007 diode at D100.

❒❒ 1.7 Install 8 pin IC sockets, one at a time, at U100, U101, U102, U103, U107, and U108. Be sure that the small half-moon notch on one end of the socket matches the notch in the outline on the board. Solder all 8 pins on each socket.

❒❒ 1.8 Install a 14 pin IC socket at U106. If the socket has a notch on one end, match it to the outline. Solder all 14 pins.

❒❒ 1.9 Install 10uH chokes (Brn-Blk-Blk) at L107 and L109. Both chokes mount vertically (see drawing step 1.2). Chokes are not polarized– it does not matter which end goes into which hole..

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❒❒ 1.10 Install 15uH chokes (Brn-Grn-Blk) at L100 and L108. L108 mounts vertically.

❒❒ 1.11 Install a 100uH choke (Brn-Blk-Brn) at L115.

❒❒ 1.12 Install a 1mH choke (Brn-Blk-Red) at L112.

❒❒ 1.13 Refer to the parts list and install all of the resistors. Some of the resistors mount horizontally and some mount vertically. Install four or five resistors at a time, turn the board over and solder and trim each lead. Check them off on the parts list as they are installed. When you trim the leads, set aside a few of the trimmed leads for use as jumpers later.

❒❒ 1.14 Select three cutoff resistor leads. Bend each into a 1/4" loop. Install one loop at TP1 (located near U102). Install the second loop at TP2 (located near U100) and the third loop at "TEST LOOP" (located near C133). Position the loops about 1/4" above the board. Do not push them down against the board. Solder and trim leads.

❒❒ 1.15 Install a 5K-Ohm trim pot (502) at R141. Solder the three leads. It is not necessary to trim these leads after soldering.

❒❒ 1.16 Install a 100K-Ohm trim pot (104) at R154. Solder the three leads.

❒❒ 1.17 Install the 100 Ohm BLUE trim pot at R103. Solder the three leads.

❒❒ 1.18 In the following step you will install four polystyrene capacitors or "poly caps." The poly caps are silver in color. They are extremely fragile. Do not twist the leads in the body of the caps or pull on them. Also, when soldering the leads, do not use excessive heat by leaving the iron on the connection too long. This can cause the cap to start melting inside. All of these caps have axial leads and are mounted horizontally.

❒❒ 1.19 Install the two 100pF poly caps (100J) at C198 and C202. Carefully solder and trim leads. Install the two 560pF poly caps (560J) at C187 and C200. Carefully solder and trim leads.

❒❒ 1.20 In the following steps you will be installing the monolithic "mono" caps. These caps are small in size and have very small printing indicating the value. Use your magnifying glass to help with the small print. These caps are generally yellow or blue in color. Also, most of these caps will mount down against the board. Some will mount slightly above the board because of the bend in the leads.

❒❒ 1.21 Install .01uF mono caps (103) at C102, C109, C112, C135, C148, C150, C160, C164, C166, C176, C203, C206, C209 and C213. Place them 4 or 5 at a time, then solder and trim the leads

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❒❒ 1.22 Install .1uF mono caps (104) at C108, C114, C115, C119, C127, C129, C138, C140, C147, C153, C155 and C156.

❒❒ 1.23 Install the remaining .1uF caps at C157, C159, C163, C167, C168, C169, C173, C174, C175, C179, C180, C205 and C210.

❒❒ 1.24 Install .047uF mono caps (473) at C196 and C197.

❒❒ 1.25 Install a 1000pF NP0 mono cap (102J) at C154.

❒❒ 1.26 Install 33pF NP0 mono caps (33J) at C149 and C158.

❒❒ 1.27 Install 47pF NP0 mono caps (47J) at C101, C185, and C189.

❒❒ 1.28 Install 68pF NP0 mono caps (68J) at C145 and C188.

❒❒ 1.29 Install a 150pF NP0 mono cap (151J) at C100.

❒❒ 1.30 Install .02uF polyester caps (203) at C181 and C182. These caps will be green or brown and are shaped like flat lozenges or "chicklets."

❒❒ 1.31 Install .033uF polyester cap (333) at C194.

❒❒ 1.32 Remove the three caps from the bag labeled "47pF and 68pF N750". Install the two 47pF N750 caps at C165 and C184. Install the 68pF N750 cap at C201.

❒❒ 1.33 Install two 120pF NP0 ceramic disc caps (121J) at C183 and C199.

❒❒ 1.34 Install a 15pF NP0 mono cap (15J) at C204.

❒❒ 1.35 Install a 220pF NP0 mono cap (221J) at C186.

❒❒ 1.36 Install 2.2pF ceramic disc caps (2.2) at C113 and C162.

❒❒ 1.37 Install a 10pF ceramic disc cap (10) at C211.

❒❒ 1.38 Install a 22pF ceramic disc cap (22) at C118.

❒❒ 1.39 Install a 47pF ceramic disc cap (47) at C161.

❒❒ 1.40 Install 82pF ceramic disc caps (82J) at C124 and C126.

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❒❒ 1.41 Install a 820pF ceramic disc cap (821J) at C212. Position it about 1/4" above the board.

❒❒ 1.42 Install 270pF ceramic disc caps (271J) at C136 and C137.

❒❒ 1.43 Install the three yellow 40pF trim caps at C103, C116, and C146. It is best to install these caps one at a time. Be sure to match the flat side on the cap with the board outline.

❒❒ 1.44 Install a .47uF bipolar electrolytic cap at C104. This cap will be labeled ".47uF 50V BP". There are *two* .47uF caps in the radio. Be sure you install the cap marked **BP at C104.** This cap is *not polarized* and can be installed either way.

❒❒ 1.45 Install the other (polarized).47uF electrolytic cap at C177, observing the correct orientation.. Be sure to install the long lead (+) in the hole labeled "+". It is best to install these caps one at a time.

❒❒ 1.46 Install a 4.7uF electrolytic cap at C208.

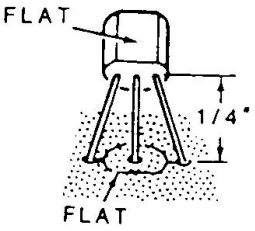
❒❒ 1.47 Install a 10uF electrolytic cap at C128.

❒❒ 1.48 Install a 22uF electrolytic cap at C152.

❒❒ 1.49 Install a 220uF electrolytic cap at C151, C178, C193, and C195.

❒❒ 1.50 Install 9 MHz crystals one at a time at Y100, Y101, Y102, Y103, Y104 and Y105. All six of these crystals are matched, so it doesn't matter which four go into the IF filter.

❒❒ 1.51 In the following steps you will install the transistors, varactor diodes and the regulators. Be sure to match up the flat side of the part with the screened outline on the board. Mount about 1/4" above the board. It is best to install these parts one at a time.



❒❒ 1.52 Install the MVAM109 varactor diodes at D104, D105 and D106.

❒❒ 1.53 Install a MV2105 varactor diode at D109.

❒❒ 1.54 Install the MV1662 varactor diode (colored stripes) at D110.

❒❒ 1.55 Install the 78L09 regulator at U105.

❒❒ 1.56 Install the 78L08 regulator at U104.

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❒❒ 1.57 Install the BS170 transistor at Q105.

❒❒ 1.58 Install MPF102 transistors at Q107, Q109 and Q110.

❒❒ 1.59 Install 2N3904 transistors at Q104, Q108 and Q111.

❒❒ 1.60 Install a 2N5770 transistor at Q106.

❒❒ 1.61 Install the 2N5179 transistor at Q103. Be sure to match up the small tab on the transistor with the screened outline on the board. Mount about 1/4" above the board.

❒❒ 1.62 Install the 2N2907A transistor at Q102. Again, be sure to match up the small tab on the part with the board. Mount about 1/4" above the board.

❒❒ 1.63 Place a white spacer on the leads of the 2N3866 transistor. Install at Q100 making sure the small tab on the case matches the board outline. Hold the transistor and spacer down against the board and solder the leads. Trim the leads.

❒❒ 1.64 Locate the 2SC2078 transistor and the black heatsink. You will also need a 4-40 x 1/4" screw, #4 lockwasher and #4 hex nut. Place the flat side of the transistor against the flat portion of the heatsink. The pins on the transistor should be pointing in the same direction as the pins on the heatsink. Slip a #4 lockwasher on the screw and start a #4 hex nut. Do not tighten. Install at Q101. Match up the pins on the transistor and heatsink with the holes in the board. Push down on the heatsink until it is seated down against the board. Tighten the transistor mounting screw. Solder and trim all three transistor leads. It is not necessary to solder the heatsink pins, but if you do so you can safely pick up and move the board by grasping the heatsink. Also, heatsink compound is not necessary for this installation.

Install the small heatsink on Q100. If it is the “flag” type heatsink, bend the flag as necessary so that it does not touch the heatsink on Q101.

❒❒ 1.65 Remove all the insulation from the large 1 1/2" length of red solid wire. Insert one end of the wire into the hole labeled “ANT” at the upper right corner of the board. Solder the connection. The other end will be connected later.

❒❒ 1.66 Install the 3 circuit pin connector at JP100. The short pins go into the board. Solder all three pins. Place the shorting plug on two of the pins.

❒❒ 1.67 Install a PC phono jack at J102. Be sure the jack is seated down on the board before soldering. Be careful as this jack will get very hot from soldering.

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❒❒ 1.68 On the remaining PC phono jack, bend the center terminal out. Locate the 33pF ceramic disc cap C214. Bend the leads out away from the cap. Insert one cap lead into the board hole that the center terminal of the phono jack J103 would normally go into. Solder and trim the lead. Position the cap so the unused lead is facing straight up. Install the modified phono jack at J103. The center terminal should be pointing at the large black heatsink. Trim the remaining lead on the cap to about 1/8". Solder this lead to the bent out center terminal pin of J103. Be sure center terminal is not touching anything nearby.

❒❒ 1.69 Install the coaxial DC power jack at J104. Be sure the jack lines up with the outline on the board before soldering.

❒❒ 1.70 Remove and discard any hardware on the bushings of the 3.5mm phone jacks and install them at J100 and J101

❒❒ 1.71 Refer to assembly pictorial Figure 8 and prepare each IC for installation as shown.

❒❒ 1.72 In the next step you will install the ICs in their sockets. Note that there is a half moon or dot index mark at one end of the IC. Be sure to match this index mark with the half moon outline on the board. Some ICs may also have a dot over pin one. When you install an IC press it firmly into socket and make sure that no pins are bent out or underneath between the body of the IC and the circuit board..

❒❒ 1.73 Carefully install the ICs as follows:

❒❒ SA602AN - U100, U102, U103 and U108 ❒❒ MC1350P - U101

❒❒ LM380N-8 - U107 ❒❒ LM380N - U106

❒❒ 1.74 Refer to assembly pictorial Figure 3, Figure 4, and Figure 5 for this step. Remove the two black toroid cores and wire from the package labeled “T100, T101". Straighten the two wires by drawing them back and forth over the edge of your work table or other square corner. Be careful not to place any kinks in the wires. Cut two 8" lengths of red wire and two 8" lengths of green wire. Hold an 8" red & green wire parallel to each other. Place the first turn on the core with the leads about 1" from the core as shown in Figure 3. Continue placing turns on the core until you have a total of 10 turns on the core. Double-check the turns count, remembering that turns are counted where each pair of wires passes through the center of the core. Cut the excess leads to 1" from the core as shown. The completed coil should look like Figure 4. Refer to Figure 5 and tin all four leads with your soldering iron as shown. You have just wound a

bifilar coil. Easy! Now wind the other coil using exactly the same procedure.

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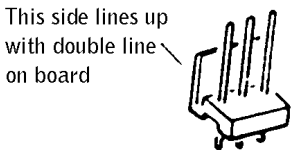
❒❒ 1.75 Install one of the completed bifilar coils at T100. The coil mounts vertically. Insert the two red wires into the holes labeled "R" and the two green wires into the holes labeled "G". From the solder side of the board remove any slack in the leads. Solder and trim all four leads. Use the same procedure and install the second bifilar coil at T101.

❒❒ 1.76 Locate the six pre-assembled Molex connectors with the red, white, and blue wires. Remove the male connector from each assembly and set the wire assemblies aside. . Notice on the male part of the connector there is a small locking tab parallel to the three long pins. When you install the connector, be sure this tab lines up with the double line on the board. The short pins go into the board and are soldered. Install male connectors one at a time at P100, P101, P102, P103, P104 and P105.



❒❒ 1.77 Set the PC board aside for now.

Chassis Assembly

❒❒ 2.1 Refer to the assembly pictorial Figures 1 and 2. From the outside of the rear panel, install the SO-239 at the holes labeled "ANTENNA". Secure with 4-40 x 5/16" hardware as shown in Figure 1. Tighten hardware.

❒❒ 2.2 Locate the large 10K ohm pot. Remove the nut and washer. Bend the small alignment tab on the front of the pot off to the side. From the inside of the front panel, install the pot in the hole with the numbers from 0 to 70 around it. Position the pot as shown in Figure 2. Use the supplied hardware. Tighten the nut.

❒❒ 2.3 Locate the small center detent panel pot labeled B10K. Remove the nut and washer. Break off the small alignment tab with your pliers. Install the pot in the front hole labeled "RIT" using the supplied hardware. Position pot as shown in Figure 2 and tighten the nut.

❒❒ 2.4 Use the same procedure to install the smaller 10K pot, with switch on the rear. This pot is labeled B10K. Install in the front panel hole labeled "AF GAIN".

❒❒ 2.5 Install the last 10K panel pot in the front panel hole labeled "BANDWIDTH". This pot is also labeled B10K.

❒❒ 2.6 Install the remaining 5K panel pot (B5K) in the front panel hole labeled “RF Gain”.

❒❒ 2.7 Set the chassis aside for now.

Final Board Assembly for 20M

❒❒ 3.1 Open the "20M" bag and inventory the parts against the parts list on page 17.

❒❒ 3.2 Install the 2.2 ohm resistor (Red-Red-Gld-Gld) at R107.

❒❒ 3.3 Install the 6.8uH choke (Blu-Gry-Gld) at L106.

❒❒ 3.4 Install five 5pF ceramic disc caps (5) at C121, C143, C170, C190 and C207.

❒❒ 3.5 Install three 18pF ceramic disc caps (18) at C130, C134, and C142.

❒❒ 3.6 Install a 22pF ceramic disc cap (22) at C133.

❒❒ 3.7 Install 47pF ceramic disc caps (47) at C171 and C192.

❒❒ 3.8 Install 120pF ceramic disc caps (121) at C105 and C107.

❒❒ 3.9 Install 150pF ceramic disc caps (151J) at C123 and C131.

❒❒ 3.10 Install 220pF ceramic disc caps (221J) at C111 and C139.

❒❒ 3.11 Install 270pF ceramic disc caps (271J) at C106, C110 and C141.

❒❒ 3.12 Install 820pF ceramic disc caps (821J) at C117 and C125.

❒❒ 3.13 Install the 18.000MHz crystal at Y106.

❒❒ 3.14 Install the four 10pF trim caps (Blue or White Body) at C120, C122, C172 and C191.

❒❒ 3.15 Install the two 20pF trim caps (Red Body) at C132 and C144.

❒❒ 3.16 Locate the length of colored #26 magnet wire. Unroll it and straighten it out by drawing it over an edge, being careful not to put any kinks in it. Prepare coil L114 as follows. Cut a 16" length of the magnet wire and locate the T44-7 white core. Refer to assembly pictorial Figure 6. Wind 26 turns of wire on the core. This is the same procedure as before except this time there is only one wire to put on the core instead of two. After winding the coil, trim both leads to 1" from the core. Refer to Figure 5 and tin each lead as shown.

❒❒ 3.17 Install the coil at L114 . This and all the coils are mounted vertically on the board. From the bottom solder side of the board, pull on leads to remove any slack. Solder and trim both leads.

(Final Board Assembly for 20M...)

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3.18 Cut two 12" lengths of the #26 magnet wire. Wind 14 turns of wire on each of the red cores. Install the coils at L101 and L102.

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3.19 Cut six 12" lengths of the #26 magnet wire. Wind 15 turns of wire on each of the yellow cores. Trim and tin each lead. Use the same procedure as above.

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3.20 Install the six wound yellow coils at L103, L104, L105, L110, L111, and L113.

❒❒

3.21 This completes assembly of the PC board. All components should be installed, soldered, and trimmed. Take the time now to look the board over and check for unsoldered or improperly soldered connections. Also, check for solder bridges. DO NOT skip over this step as it may save you a lot of frustration and expense later. About 95% of all radios returned for repair and troubleshooting are found to have unsoldered or improperly soldered connections on the PC board.

Final Assembly

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4.1 Place the chassis assembly in front of you so the front panel faces you. Position the PC board over the four spacers staked to the bottom of the chassis. The red heatsink should be toward the rear. Place a #4 lockwasher on a 4-40 x 1/4" screw. Install at one of the four board mounting holes. Do not tighten the screw yet. Repeat at the remaining three locations. Tighten all four screws.

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4.2 Locate the six wire assemblies with Molex connectors. Using an indelible marker, label the connectors as P100, P101, P102, P103, P104, and P105. The wires in each assembly will be cut to the indicated lengths in this step. Simply measure from the top of the housing where the three wires exit. Double check to make sure you are on the correct connector before cutting the wires. Cut the red, white, and blue wire on each connector as indicated below. Note: On P100 the blue wire is not used– cut it flush with the connector.

❒❒ P100 - 9" (See note above)
❒❒ P101 - 4"
❒❒ P102 - 3 ½"
❒❒ P103 - 4 ½"
❒❒ P104 - 4"
❒❒ P105 - 3"

(Final Assembly...)

❒❒ 4.3 In the following steps all the loose wire ends will be connected to the controls on the front panel.

❒❒ 4.4 Carefully remove 1/4" of insulation from the free end of each of the wires coming from the Molex connectors. Inspect each wire end to be sure that you have nut cut any of the wire strands with your wire stripper. In the following steps, the word “connect” means to connect the wire to the indicated terminal and solder it. When you have connected all of the wires to the controls, plug the connectors into the matching (same P number) jacks on the circuit board. Refer to assembly pictorial Figure 2 for the following steps.

❒❒ 4.5 Wire Assembly P100. Connect the RED wire to SW100/4. Connect the WHITE wire to SW100/5. SW100 is located on the rear of the AF GAIN pot.

❒❒ 4.6 Wire Assembly P105. Connect the wires to the terminals on the AF GAIN pot as follows: RED - 1; WHITE - 2; BLUE - 3.

❒❒ 4.7 Wire Assembly P102: Connect the wires to the terminals on the RIT pot as follows: BLUE - 1; WHITE - 2; RED - 3.

❒❒ 4.8 Wire Assembly P103: Connect the wires to the terminals on the BANDWIDTH pot as follows: RED - 1; WHITE - 2; BLUE - 3.

❒❒ 4.9 Wire Assembly P104: Connect the wires to the terminals on the MAIN TUNE pot as follows: RED - 1; WHITE - 2; BLUE - 3.

❒❒ 4.10 Wire Assembly P101: Connect the wires to the terminals on the RF GAIN pot as follows: BLUE - 1; WHITE - 2; RED - 3.

❒❒ 4.11 Place a bend in the large bare wire coming from the hole labeled “ANT”. Insert the free end into the center pin of the SO-239 antenna connector, J105. Solder the connection.

❒❒ 4.12 Rotate the shafts of all five pots on the front panel fully counterclockwise. Install a small knob on the shaft of the AF GAIN pot. Turn the knob until the white indicator is lined up with the OFF tick mark. Tighten the set screw.

❒❒ 4.13 Rotate the shaft of the RIT pot until it is in the detent at midrange. Place a small knob on the shaft with the white line pointing straight up. Tighten the set screw.

❒❒ 4.14 Install a small knob on the shaft of the BANDWIDTH pot.. Set the white line to the WIDE tick mark on the left and tighten the set screw.

(Final Assembly...)

❒❒ 4.15 Install a small knob on the shaft of the RF GAIN pot.. Set the white line to the tick mark at lower left and tighten the set screw.

❒❒ 4.16 Double-check that the shaft on the MAIN TUNE pot is turned all the way counterclockwise. Install the large knob on the shaft. Position the knob so that the white indicator is lined up with the short small tick mark below the knob. Tighten the set screw.

❒❒ 4.17 Turn the radio over. Remove the backing paper from the four cabinet feet. Install the four feet about 1 inch in from each corner.

Congratulations! Assembly of your OHR100A transceiver is complete, and all that remains is to align it.

Alignment for 20M

❒❒ 5.1 The alignment of the OHR100A is not difficult to perform. You will need the following tools and materials:

A well regulated and filtered power supply capable of supplying 13.6VDC @ 1A
Frequency counter
Digital voltmeter
QRP dummy load
QRP wattmeter
Your “main” station transceiver
Small screwdriver or alignment tool to adjust the trim caps
Q-dope or clear finger nail polish to lock the turns on the VFO coil.

❒❒ 5.2 If you do not have the necessary equipment, or are otherwise unable to complete the alignment, Oak Hills Research will align and return the radio to you for a fee.. This alignment service is for properly assembled kits only. We will not accept incomplete kits for alignment. Complete the Service Form that came with your kit, and return it with the kit to Oak Hills Research.

❒❒ 5.3 Locate the molded power cable assembly. The POSITIVE lead is connected to the center pin of the molded plug. Use your ohmmeter to identify the POSITIVE lead. Be sure this POSITIVE lead connects to the POSITIVE terminal of your power supply. If the positive terminal of your power supply is not fused, you should add an in-line fuse holder with a 1A fuse in the positive supply line.

OHR 100A

(Alignment for 20M...)

❒❒ 5.4 Attach the power plug to the 13.6VDC coaxial power jack on the rear panel. Rotate the AF GAIN control until it clicks. Turn the power supply on. The radio should be drawing about 70mA of current on receive. Plug in and turn on your frequency counter. Allow everything to warm up for 30 minutes.

❒❒ 5.5 Set the main tuning dial to “0". Set the RIT pot to its center detent position.

❒❒ 5.6 Attach your frequency counter probe to the TEST LOOP (located near the left center of the board) and ground. Set your digital voltmeter up to measure 0.1 to 0.4 Volts or 100mV to 400mV and attach the positive lead of your digital voltmeter to TP1 (located near the right center of the board). Attach the negative lead to ground.

Spread or compress the turns on L114 to get the frequency set at 23.000 MHz according to your counter. Adjust trim caps C172 and C191 for maximum voltage at the frequency of 23.000MHz. You may have to adjust the caps for a peak before you are able to read the frequency.. The peak signal will be about 100mV to 400mV as read on your voltmeter. When you have the maximum voltage at the correct frequency, turn the main tuning dial through its full range. The signal at the test point should go from 23.000 to 23.080MHz and have about the same voltage on your voltmeter across the entire tuning range. If the voltage is uneven across the tuning range, alternately adjust C172 and C191 until it is fairly even.

After you have the correct frequency at the test loop, carefully apply a coat of Q-dope or clear nail polish to the VFO coil, L114. The frequency may shift slightly as the Q-dope or nail polish dries. This is normal. The frequency should return to its original value or at least very close, but note that nail polish will continue to dry for up to 24 hrs. If you continue the alignment process before the coating is completely dry you may need to repeat the following parts of the alignment process.

❒❒ 5.7 Set the main tuning dial to the center of its range. Attach a pair of headphones to the headphone jack on the rear panel. Set the bandwidth control to mid-range. Set the RF gain control fully clockwise. You should be hearing some background noise in the headphones.

OHR 100A
(Alignment for 20M...)

❒❒ 5.8 Terminate your main station transceiver into a 50 ohm dummy load. Set the transceiver up for operation on 14030 MHz with a few watts of output power. Key the main station transceiver and attempt to find the signal on the OHR100A by adjusting the main tuning knob. Don't leave the radio keyed for more than 60 seconds at a time. You may have to attach a test lead or piece of wire to the bare wire connected to the SO-239 on the OHR100A to increase the signal level. Once you can hear the signal from the station transceiver, adjust the yellow trim cap, C146 for a nice mellow sounding 700 Hz tone. SLOWLY turn the main tuning dial on the OHR100A toward "0". The tone should get lower and lower in frequency. If it goes higher and higher in frequency, you have the BFO adjusted on the wrong side of zero beat and will need to adjust C146 to move the signal to the other side of zero beat. Also, as you turn the BANDWIDTH control fully clockwise (narrow), the received signal will be attenuated (reduced) slightly. If the reduction is large or if the signal disappears completely, then touch up the adjustment of C146 slightly. Adjust yellow trim cap C116, and trim caps C132 and C144 for maximum signal level. Unkey the main station transceiver. If you connected a wire or test lead to the SO-239, remove it.

❒❒ 5.9 Attach a QRP wattmeter terminated in a 50 ohm dummy load to the antenna connector on the OHR100A. Attach a key to the key jack.

❒❒ 5.10 With a small flat blade screwdriver, through the small hole in the rear panel, set the power adjust control to just above mid-range. Set the main tuning dial to about "30". Attach the positive lead of your voltmeter to TP2. Key the OHR100A. Don't leave the radio keyed for more than 30 seconds at a time. Adjust trim caps C120 and C122 for maximum power output on the wattmeter and maximum voltage on the voltmeter. Adjust the power adjust control for maximum power output. Readjust C120 and C122 for maximum power. Turn the main tuning dial from 0 to 70 while watching output power. The power out should be about 5 watts and should be fairly constant throughout the tuning range. If it is not, continue adjusting C120 and C122. Unkey the radio. Note: The radio will draw about 700 to 800mA with 5 watts output.

❒❒ 511 To adjust the transmit offset, follow this procedure. Set your main station transceiver to transmit on 14.040 MHz into its dummy load. Key the radio. On the OHR100A, carefully tune this signal in for a 700 Hz tone. Unkey the main station transceiver. Do not move the tuning dial on either radio. Attach a 50 ohm dummy load to the OHR100A. Key the 100A. Adjust yellow trim cap C103 until you hear a nice mellow sounding 700 Hz tone in the main station transceiver. Unkey the OHR100A. After a few minutes of cool down, again key the radio and adjust trim pot R141 for the sidetone frequency you want. Adjust trim pot R154 for a comfortable sidetone level. Unkey the radio.

OHR 100A
(Alignment for 20M...)

❒❒

5.12 Attach a good 50 Ohm antenna (you can use your main station transceiver to tune the antenna if necessary) to the SO-239 antenna connector on the OHR100A. Tune in a weak signal near the center of the dial. Carefully peak trim caps C116, C132, and C144 for the maximum received signal. This completes the alignment of your OHR100A transceiver

❒❒

513 Bundle up the wires going to the pots on the front panel and the red and white wires going to the on/off switch on the AF GAIN pot. Dress the wires up as neatly as possible. Use the plastic wire ties around the groups of wires to hold them in place. Be sure there are no wires anywhere near the VFO coil L114.

❒❒

5.14 Place the black cabinet cover in place and secure with the four black 1/4" sheet-metal screws.

OPERATION

The operation of the OHR100A is easy and straightforward. Simply attach a power supply, your favorite key, a good 50 ohm antenna and your headphones or speaker and start enjoying yourself.

The variable bandwidth control is used to vary the bandwidth of the four pole crystal filter from about 1.5 KHz down to 350 Hz. It is best to set the bandwidth control to a wider setting while tuning around the band and then adjust it to a narrower setting once a signal is tuned in.

The RIT is used to change the receive frequency by approximately 1 KHz either way, without affecting the transmit frequency. Use it to tune in a station that is off-frequency, or to push an unwanted signal out of the filter passband. It is best to leave the RIT in its center dentent position when not in use.

The RF gain control is used to adjust the gain of the RF amplifier in the receiver. Maximum gain occurs when the knob is fully clockwise. The 100A has a very great “dynamic range” so you will want to use full RF gain only when needed. And you can often eliminate unwanted noise by reducing the RF gain to a point where you can hear only the desired signal.

The power adjustment control at the rear panel is used to adjust transmitter power output from 0 to full output. The “OSC OUT” jack on the rear panel provides the LO signal for use with a counter such as the DD-1.

The audio circuit in the OHR100A is designed for headphone or speaker operation. The jacks are 3.5mm type. For headphone use, there is a shorting plug at JP100 to select Mono or Stereo type phones. The speaker amplifier and jack become active only when the headphones are removed.

We hope you have enjoyed building the OHR100A and that it provides many years of reliable service.

Parts List, 20 Meter Band Pack

	QTY	OHR P/N	DESCRIPTION	INSTALL AT	MARKINGS	PART ID
	1	6-229-14	2.2 Ohm 5% 1/4W Resistor	R107	Red-Red-Gld-Gld	
	4	TC04	10pF Trim Cap	C120,122,172,191	Blue or White Body	4
	2	K341	20pF Trim Cap	C132,144	Red Body	4
	5	NP02	5pF 5% Disc Cap	C121,143,170, 190,207	5	3
	3	NP05	18pF 5% Disc Cap	C130,134,142	18 or 180J	3
	1	K271	22pF 5% Disc Cap	C133	22 or 220J	3
	2	K270	47pF 5% Disc Cap	C171,192	47 or 470J	3
	2	NP13	120pF NP0 Disc Cap	C105,107	121J	3
	2	K272	150pF 5% Disc Cap	C123,131	151J	3
	2	K278	220pF 5% Disc Cap	C111,139	221J	3
	3	K283	270pF 5% Disc Cap	C106,110,141	271J	3
	2	K288	820pF 5% Disc Cap	C117,125	821J	3
	1	K248	18 MHz Crystal	Y106	18.000MHz	8
	1	CH13	6.8uH Choke	L106	Blu-Gry-Gld-Gld	5
	2	T37-2	Red Toroid Core	L101,102	14T #26 Wire	37
	6	T37-6	Yellow Toroid Core	L103,104,105,110, 111,113	15T #26 Wire	37
	1	T44-7	White Toroid Core	L114	25T #26 Wire	37

Parts List

OHR100A

	QTY	OHR P/N	DESCRIPTION	INSTALL AT	MARKINGS	PART ID
	2	6-279-14	2.7 Ohm 1/4W 5% Resistor	R138,147	Red-Vio-Gld-Gld	
	1	6-339-14	3.3 Ohm 1/4W 5% Resistor	R105	Org-Org-Gld-Gld	
	1	6-100-14	10 Ohm 1/4W 5% Resistor	R119	Brn-Blk-Blk-Gld	
	3	6-470-14	47 Ohm 1/4W 5% Resistor	R112,115,151	Yel-Vio-Blk-Gld	
	1	6-680-14	68 Ohm 1/4W 5% Resistor	R118	Blu-Gry-Blk-Gld	
	1	6-101-14	100 Ohm 1/4W 5% Resistor	R150	Brn-Blk-Brn-Gld	
	1	6-271-14	270 Ohm 1/4W 5% Resistor	R128	Red-Vio-Brn-Gld	
	6	6-471-14	470 Ohm 1/4W 5% Resistor	R102,104,111,114,134,146	Yel-Vio-Brn-Gld	
	1	6-821-14	820 Ohm 1/4W 5% Resistor	R129	Gry-Red-Brn-Gld	
	3	6-102-14	1K Ohm 1/4W 5% Resistor	R106,136,145	Brn-Blk-Red-Gld	
	5	6-222-14	2.2K Ohm 1/4W 5% Resistor	R100,109,117, 120,121	Red-Red-Red-Gld	
	1	6-122-14	1.2K Ohm 1/4W 5% Resistor	R143	Brn-Red-Red-Gld	
	1	6-332-14	3.3K Ohm 1/4W 5% Resistor	R130	Org-Org-Red-Gld	
	1	6-362-14	3.6K Ohm 1/4W 5% Resistor	R132	Org-Blu-Red-Gld	
	3	6-472-14	4.7K Ohm 1/4W 5% Resistor	R101,116,162	Yel-Vio-Red-Gld	
	1	6-562-14	5.6K Ohm 1/4W 5% Resistor	R133	Grn-Blu-Red-Gld	
	1	6-622-14	6.2K Ohm 1/4W 5% Resistor	R131	Blu-Red-Red-Gld	
	2	6-682-14	6.8K Ohm 1/4W 5% Resistor	R135,140	Blu-Gry-Red-Gld	
	5	6-103-14	10K Ohm 1/4W 5% Resistor	R108,122,123, 125,152	Brn-Blk-Org-Gld	
	2	6-183-14	18K Ohm 1/4W 5% Resistor	R148,149	Brn-Gry-Org-Gld	
	2	6-273-14	27K Ohm 1/4W 5% Resistor	R110,113	Red-Vio-Org-Gld	
	1	6-393-14	39K Ohm 1/4W 5% Resistor	R155	Org-Wht-Org-Gld	
	6	6-104-14	100K Ohm 1/4W 5% Resistor	R124,126,127,142,144,156	Brn-Blk-Yel-Gld	
	1	6-122-14	1.2K Ohm 1/4W 5% Resistor	R139	Brn-Red-Red-Gld	
	2	6-105-14	1M Ohm 1/4W 5% Resistor	R137,153	Brn-Blk-Grn-Gld	

OHR100A

	QTY	OHR P/N	DESCRIPTION	INSTALL AT	MARKINGS	PART ID
	2	CH14	10uH Choke	L107,109	Brn-Blk-Blk	5
	2	CH16	15uH Choke	L100,108	Brn-Grn-Blk	5
	1	CH26	100uH Choke	L115	Brn-Blk-Brn	5
	1	CH32	1mH Choke	L112	Brn-Blk-Red	5
	2	1N34A	Germanium Diode	D101,107		6
	1	1N4007	Silicon Diode	D100	1N4007	6
	2	1N4148	Silicon Diode	D108,111	1N418	6
	1	2N2907A	PNP Transistor	Q102	2N2907A	7
	1	2N3866	NPN Transistor	Q100	2N3866	11
	3	2N3904	NPN Transistor	Q104,108,111	2N3904	38
	1	2N5179	NPN Transistor	Q103	2N5179	7
	1	2N5770	NPN Transistor	Q106	2N5770	38
	1	2SC2078	NPN Transistor	Q101	C2078	18
	1	78L08	8V Regulator	U104	78LO8	
	1	78L09	9V Regulator	U105	78LO9	
	1	BS170	TMOS Fet	Q105	BS170	
	3	MPF102	JFET	Q107,109,110	MPF102	38
	1	MV1662	Varactor Diode	D110	Brn/Gry Stripes	17
	1	MV2105	Varactor Diode	D109	MV2105	17
	3	MVAM109	Varactor Diode	D104,105,106	MVAM109 or Stripes	17
	4	NE/SA602AN	Mixer/Osc 8 Pin IC	U100,102,103,108	NE/SA602AN	41
	1	LM380N-14	Audio Amp 14 Pin IC	U106	LM380N	40
	1	LM380N-8	Audio Amp 8 Pin IC	U107	LM380N-8 orJR01AC	41
	1	MC1350P	IF Amp 8 Pin IC	U101	MC1350P	41
	1	K109	.033uF Poly Cap (Green)	C194	2A333J	9
	2	K111	.02uF Poly Cap (Green)	C181,182	2A203J	9
	1	K269	10pF 5% Disc Cap	C211	10	3
	1	K270	47pF 5% Disc Cap	C161	47	3
	1	K271	22pF 5% Disc Cap	C118	22	3
	1	K288	820pF 5% Disc Cap	C212	821J	3
	2	K283	270pF 5% Disc Cap	C136,137	271J	3
	2	K285	82pF 5% Disc Cap	C124,126	82J	3
	2	K311	2.2pF 5% Disc Cap	C113,162	2.2'	3
	2	K402	47pF N750 Mono Cap	C165,184	47 (in separate bag)	3
	1	K406	68pF N750 Mono Cap	C201	68 (li separate bag)	3
	2	K407	560pF Poly Cap Axial Leads	C187,200	560J	36

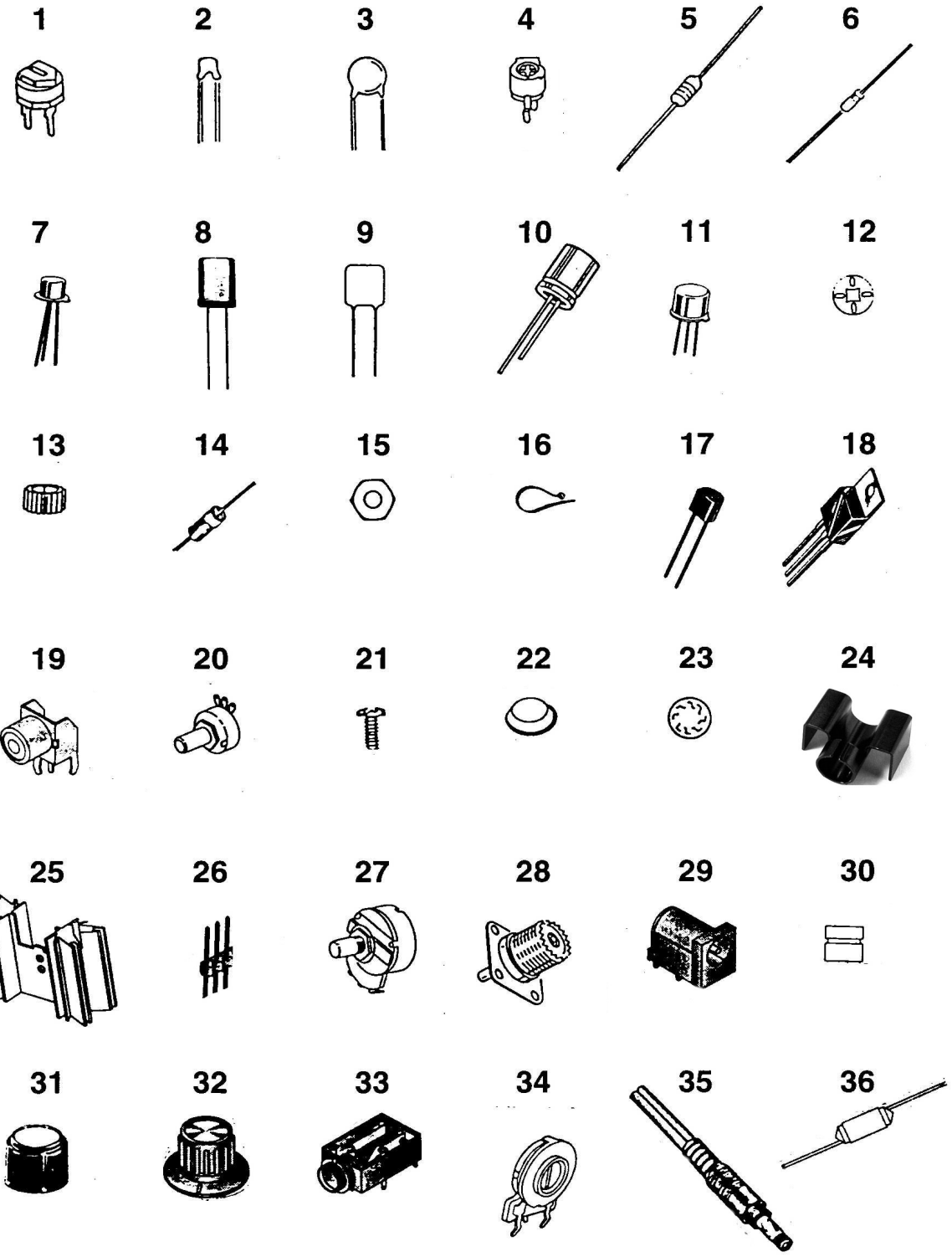
OHR100A

QTY	OHR P/N	DESCRIPTION	INSTALL AT	MARKINGS	PART ID
2	K408	100pF Poly Cap Axial Leads	C198,202	100J	36
14	MC101	.01uF Mono Cap	C102,109,112,135,148,150,160, 164, 166,176,203,206, 209,213	103	2
25	MC102	.1uF Mono Cap	C108,114,115,119,127,129,138, 140,147,153,155,156,157,159, 163,167,168,169,173,174,175, 179,180,205, 210	104'	2
2	MC104	0.0474uF Mono Cap	C196,197	473	2
1	MC12	15pF NPO Mono Cap	C204	15J	2
2	MC16	33pF NPO Mono Cap	C149,158	33J	2
3	MC18	47pF NPO Mono Cap	C101,185,189	47J	2
2	MC20	68pF NPO Mono Cap	C145,188	68J	2
1	MC24	150pF NPO Mono Cap	C100	151J	2
1	MC26	220pF NPO Mono Cap	C186	221J	2
1	MC34 (32)	1000pF NPO Mono Cap	C154	102J	2
1	NP08	30pfor 33pF NP0 Ceramic Disc Cap	C214 (on J103)	30J or 33J	
2	NP13	120pF 5% NPO Disc Cap	C183,199	121J	2
1	CE01	.47uF Elec Cap	C177	.47uF	10
4	CE011	220uF Elec Cap	C151,178,193,195	220uF	10
1	CE01BP	.47uF Bipolar Elec Cap	C104	.47uF BP	10
1	CE05	4.7uF Elec Cap	C208	4.7uF	10
1	CE06	10uF Elec Cap	C128	10uF	10
1	CE07	22uF Elec Cap	C152	22uF	10
1	MP03	5K Pot	R161	B5K	20
1	MP04	10K Pot	R157	B10K	20
1	MP08	10K Pot w/Switch	R159	B10K	20
1	K013	10K Center Detent Pot	R160	B10K	20
1	POT10	100K Ohm PC Trim Pot	R154	104	1
1	POT6	5K Ohm PC Trim Pot	R141	502	1
3	TC09	40pF Trim Cap	C103,116,146	Yellow Body	4
4	K296	Small Knob			31
1	K318	10K Precision Pot (Large)	R158	10K	27
6	K319	Preassembled 3 Ckt Molex Conn w/Red-Wht-Blu Wires	P100,101,102,103, 104,105		44
1	K321	Large Knob			32
2	K333	PC Phono Jack	J102,103		19
1	K351	3 Circuit Pin Connector	JP100		26
1	K352	Shorting Plug	JP100		30

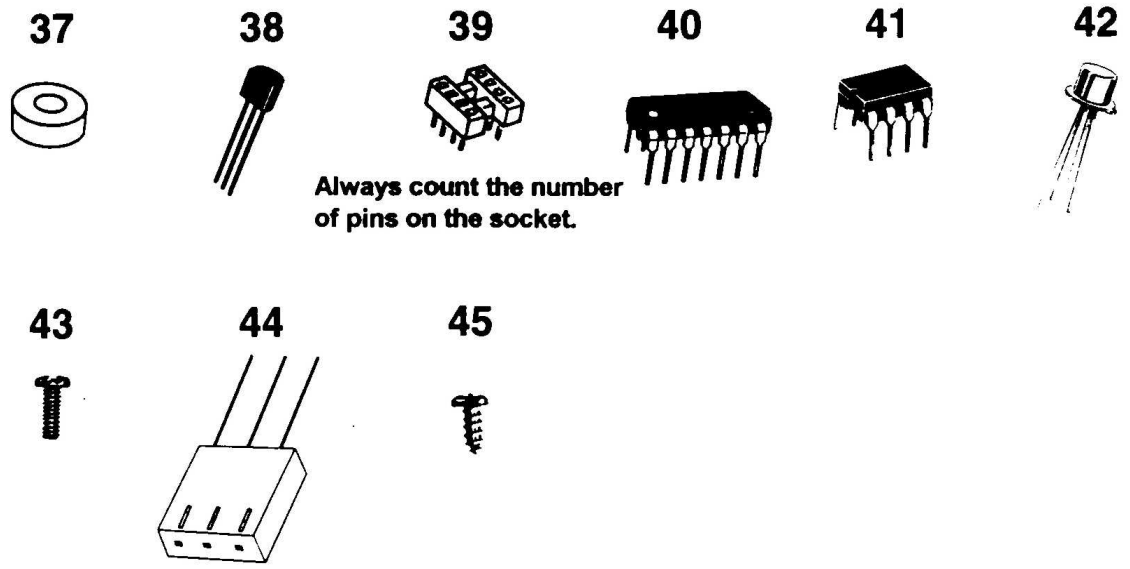
OHR100A

QTY		OHR P/N	DESCRIPTION	INSTALL AT	MARKINGS
	2	K400	3.5mm Phone Jack	J100,101	
	1	K404	Coaxial DC Power Jack	J104	
	1	K405	100 Ohm PC Trim Pot	R103	X201R101B
	2	FT37-43	Black Ferrite Core w/wire	T100,101	10 Bifilar Turns #26
	1	HS03	TO-39 Small Heatsink		
	1	HS04	Large Heatsink		
	6	ICS01	8 Pin IC Socket		
	1	ICS02	14 Pin IC Socket		
	1	K027	TO-39 Transistor Spacer		
	6	K032	9MHz Crystal	Y100,101,102,103, 104,105	9.000 MHz
	5	K056	4-40 x 5/16" Machine Screw		
	9	K058	#4 Lockwasher		
	5	K059	#4 Hex Nut		
	4	K129	#6 x 1/4" Black Sheet Screw		
	4	K162	4-40 x 1/4" Machine Screw		
	4	K132	Rubber Feet		
	4	K145	Plastic Cable Ties		
	1	K092	SO-239 Ant Connector	J105	
	1	1 1/2"	Large Solid Wire		
	1	K234	Molded Power Cable		
	1	10-120-A	Chassis Bottom		
	1	10-120-B	Cabinet Cover		
	1	40-216	PC Board		

Parts Pictorial



Parts Pictorial



Capacitor Identification Guidelines

Capacitors cause more problems in parts identification than any other component. Different manufacturers use different number schemes, some types are interchangeable, and sometimes we supply an available equivalent if we have trouble getting a specific part. These changes are too frequent to keep up with in the manual, so please note the following if you see apparent discrepancies between the part supplied and the description listed in the parts lis.

1. Ceramic disc caps and mono caps are interchangeable. Historically mono caps were more expensive but often that is no longer the case, particularly where a specific temperature compensation (e.g. NP0) is required. You may find cases where a ceramic disc cap has been specified, but a mono cap has been supplied. But it is also possible that your kit will use both ceramic disc and mono caps of the same value– if that is the case, then the temperature standards will be different and the two cannot be interchanged.

2. Low value (less than 10pF) caps are increasingly difficult to find, and we may occasionally make a substitution such as 3pF where 2.2pF is called for. Similarly you may find a K (10%) tolerance code instead of a J (5%) as specified– in which case we have already determined that a 10% tolerance is acceptable for the specific cap. Often a substituted value will be within the tolerance range of the originally specified part.

3. Picofarad values greater than 100 are marked with two digits plus a multiplier, like resistors. Values under 100 can be marked that way or with just the one or two digit value. Thus a 47pF cap could be marked 47 or 470. A 470pF cap cannot be marked 470; it will be always be marked 471 (4, 7, and one zero).

Assembly Pictorial

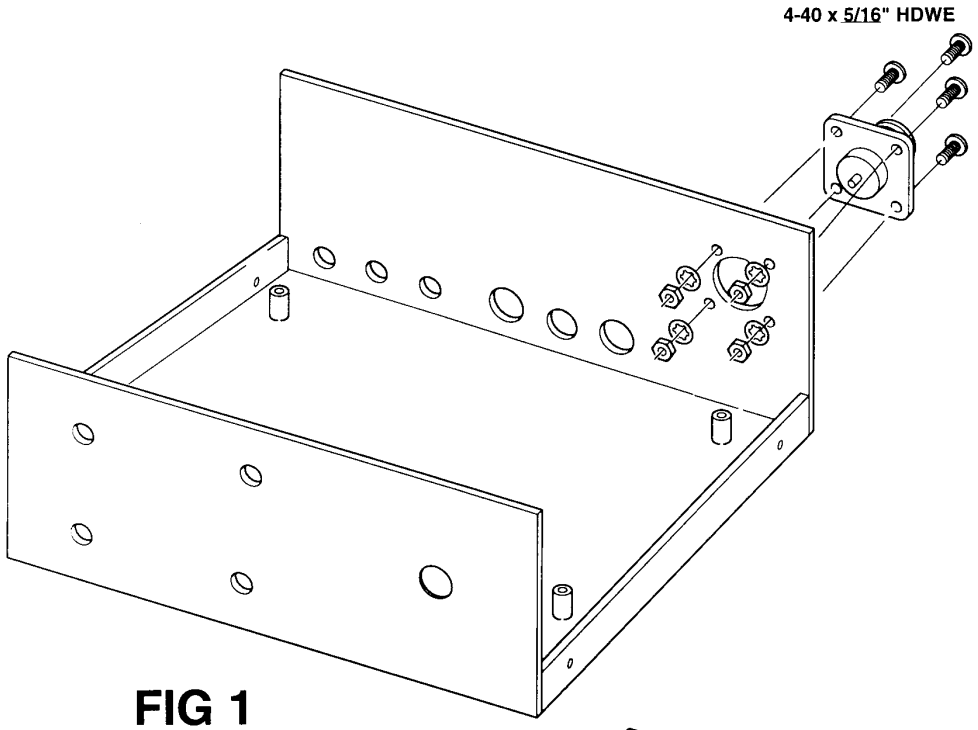


FIG 1

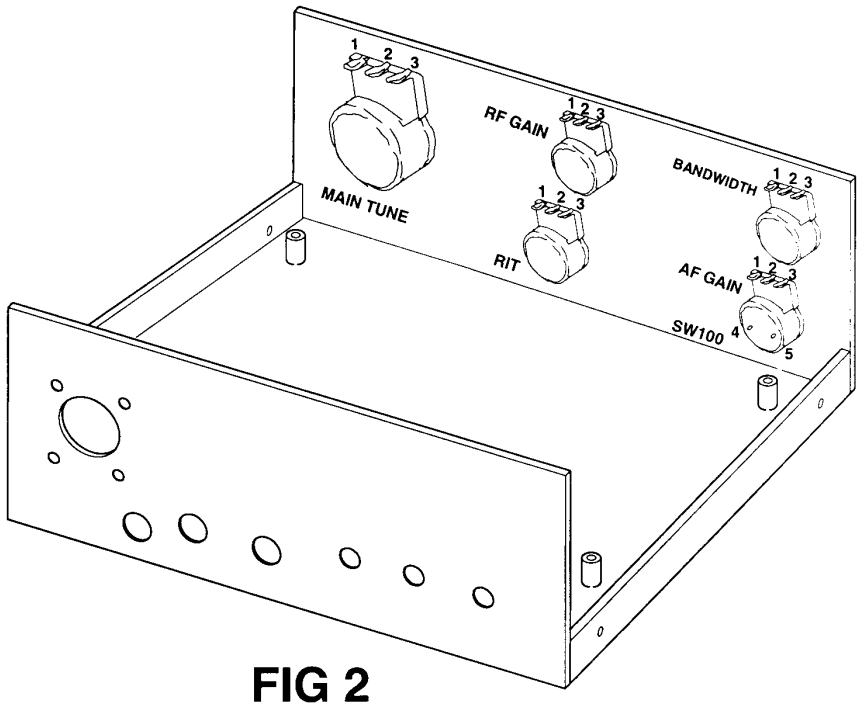
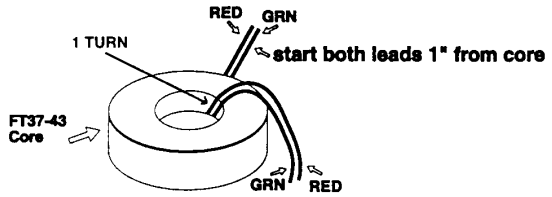


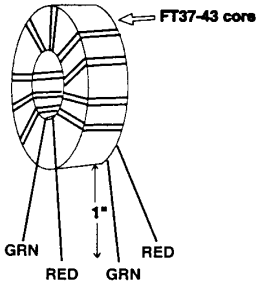
FIG 2

Assembly Pictorial



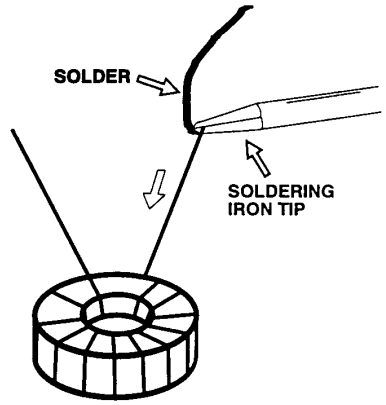
Everytime the wires pass through the center of the core, you count that as one turn. Turns are always counted on the inside of the core.

FIG 3



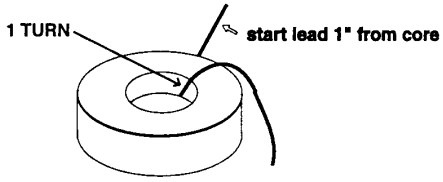
After winding, trim all four leads to 1" from core. Tin each lead to the core.

FIG 4



To tin the lead, place the soldering iron tip and solder on the lead near the end and feed a small amount of solder to the tip and lead. Move the tip back and forth a small amount. Keep feeding more solder to the tip and lead. The lead will start to tin. As it does, slowly move the tip and solder up the lead toward the core. As you do, the lead will become tinned. Continue until the entire lead is tinned. Repeat with the other lead or leads.

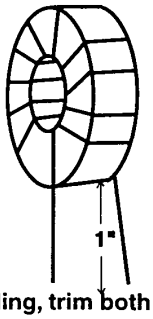
FIG 5



Everytime the wire passes through the center of the core, you count that as one turn. Turns are always counted on the inside of the core.

FIG 6

For illustration purposes only. Actual number of turns on core varies from coil to coil.



After winding, trim both leads to 1" from core. Tin each lead to the core.

FIG 7

Before you install an IC, lay it down on its side as shown below and very carefully roll it toward the pins to bend the lower pins into line. Then turn the IC over and bend the pins on the other side in the same manner.

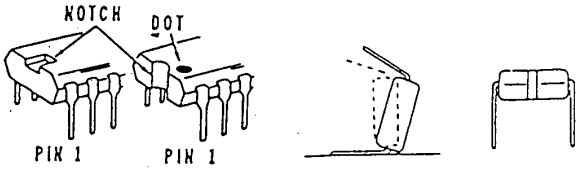
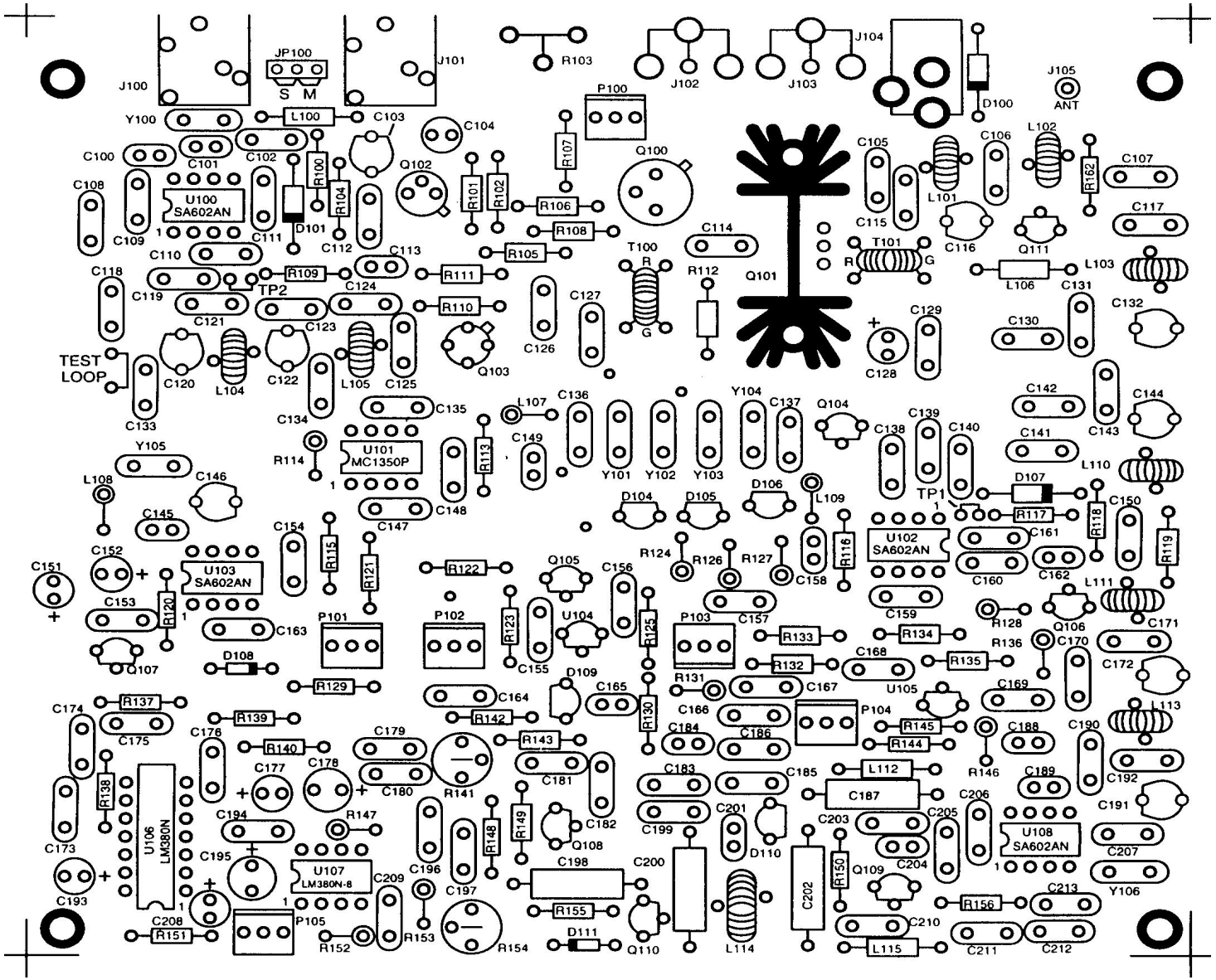
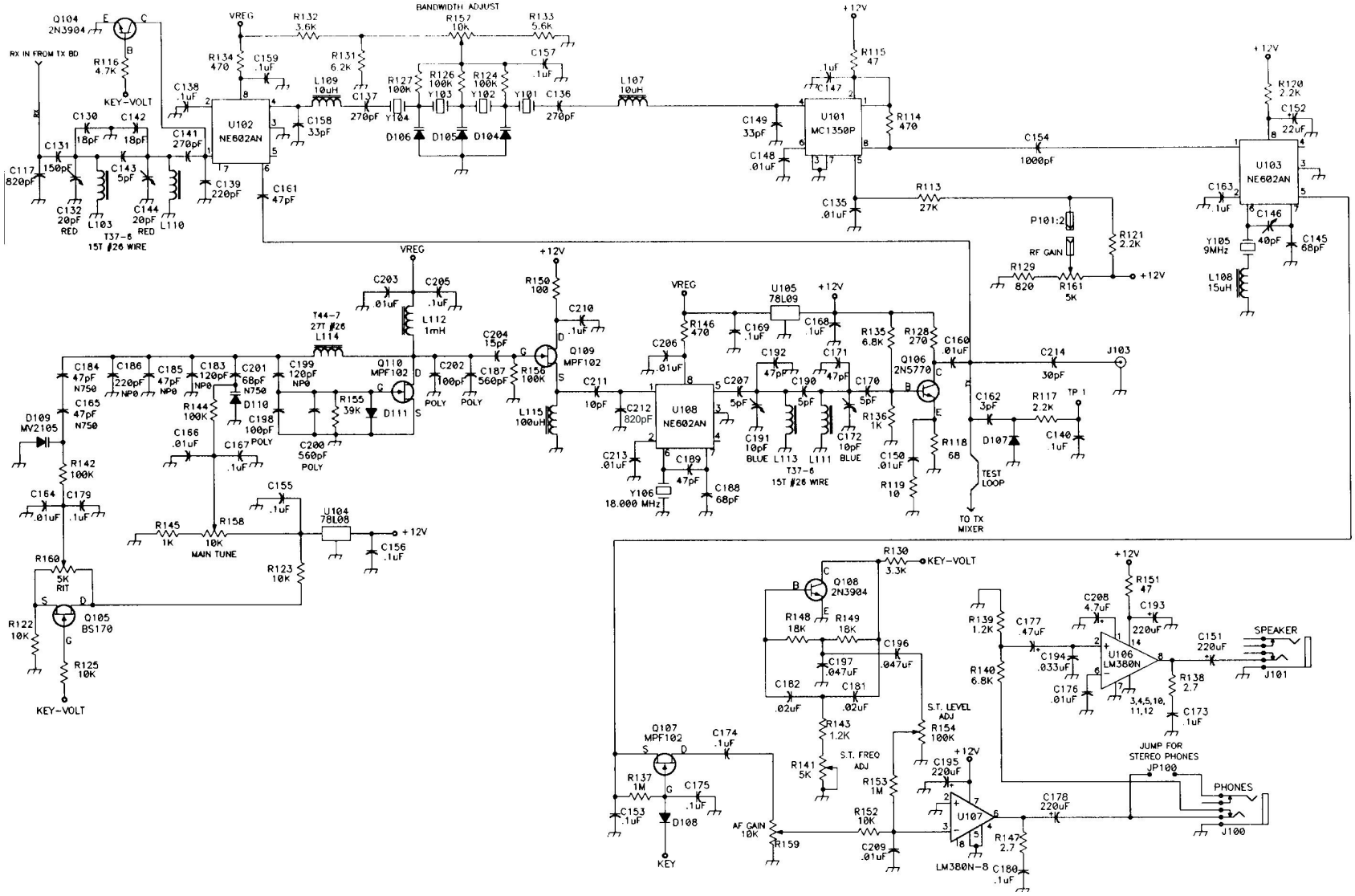


FIG8

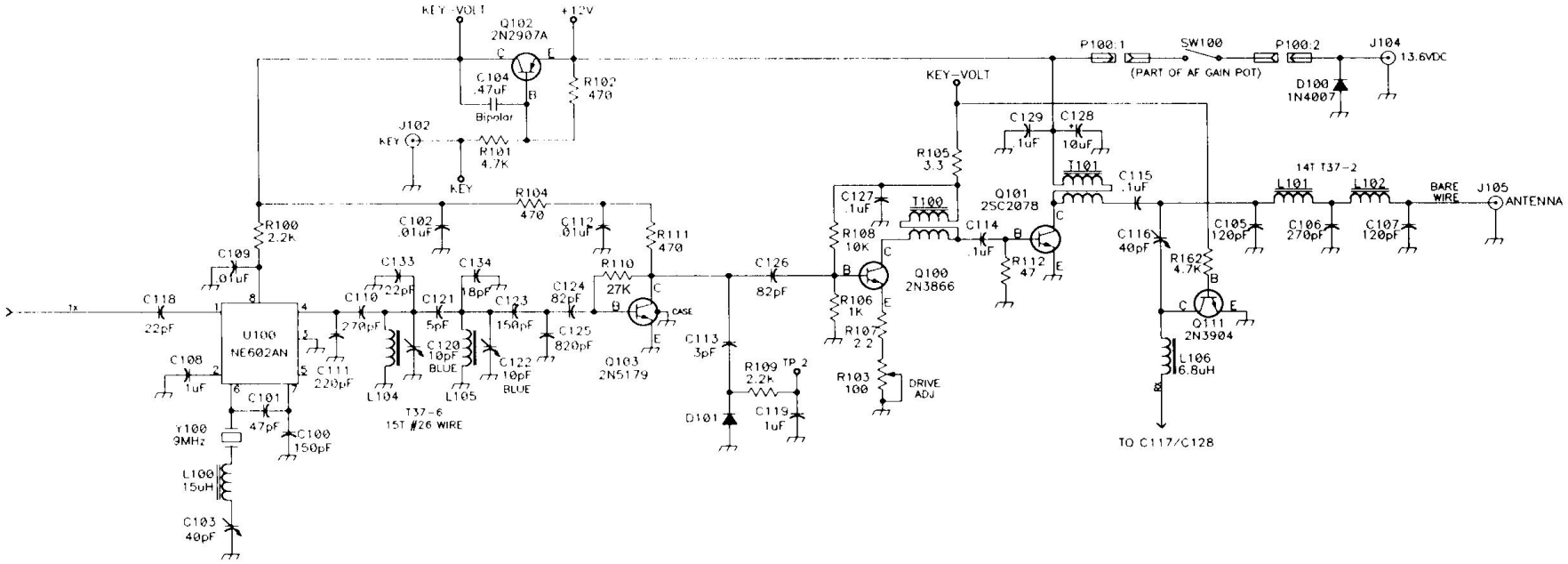
Parts Overlay





Receiver Section Schematic, 20M

Transmitter Section Schematic, 20M



1 YEAR LIMITED WARRANTY

PARTS – Replacements for defective parts will be supplied free of charge for a period of one year from the date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. If you have a defective part, you may obtain a replacement by calling us at 303-752-3382 or by sending e-mail to support@OHR.com. We will pay the shipping charges on these parts.

SERVICE LABOR – For a period of one year from the date of purchase, any malfunction caused by defective parts will be corrected at no charge to you. You must deliver the unit at your expense to us. This warranty does not cover the correction of assembly errors or damage incurred during assembly of the kit.

TECHNICAL CONSULTATION – You will receive free consultation on any problem you may encounter in the assembly or use of our product. Just give us a call at (303) 752-3382 or e-mail us at support@OHR.com and we will be glad to assist you.

NOT COVERED – The correction of assembly errors, adjustments, calibration, damage due to modification, misuse, abuse or negligence are not covered by this warranty. Use of corrosive solder will void the warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use or customer assembly.

This warranty covers only Oak Hills Research products and is not extended to other equipment or components that a customer uses in conjunction with our products.

EFFECTIVE WARRANTY DATE – Warranty begins on the date of first consumers purchase. Please supply a copy of your invoice when you request warranty service or parts.

SHIPPING UNITS – When shipping a unit back to us for repair, use adequate packing material. Damage due to inadequate packing cannot be repaired under this warranty.

Oak Hills Research
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